

*Presentation to the Neutrinos & Society Sub-Panel:*

# **The Nuclear Science & Security Consortium (NSSC) and Neutrino Science**



**Training the Next Generation**



Karl van Bibber

*Executive Director, NSSC  
Chair, Department of Nuclear Engineering  
University of California Berkeley*

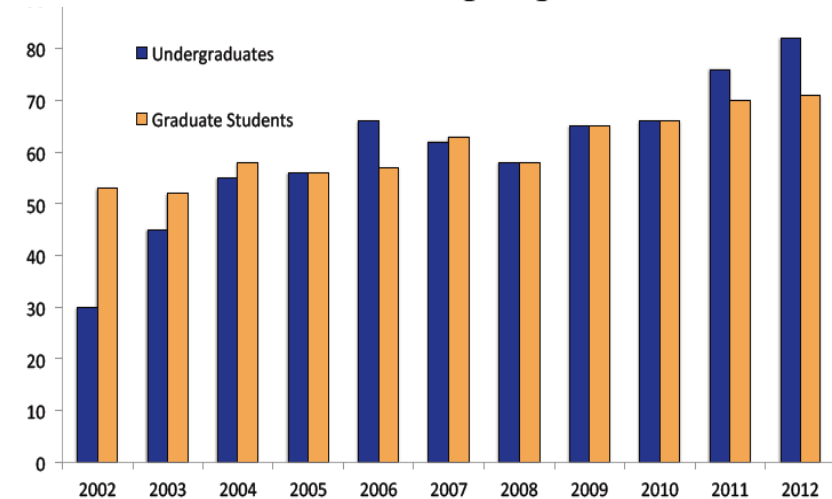
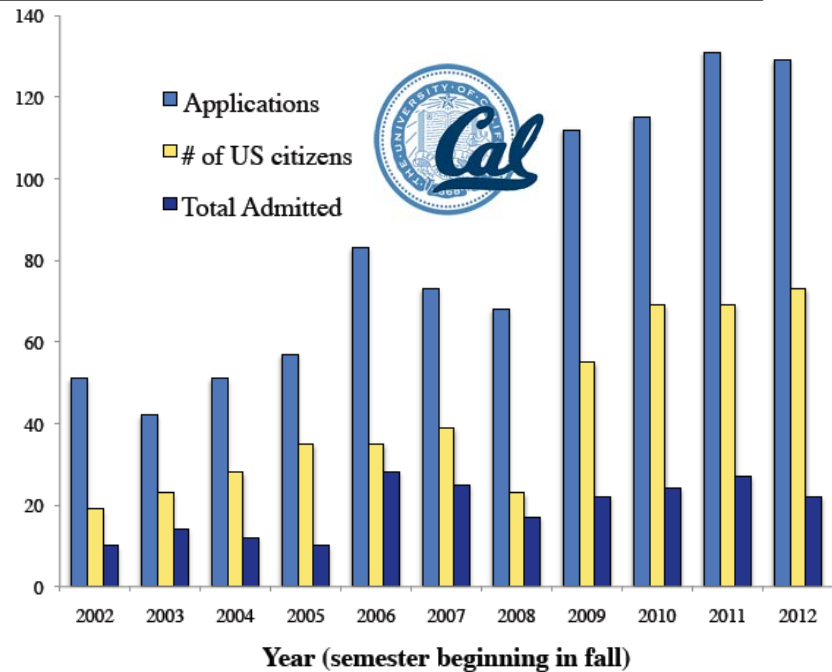
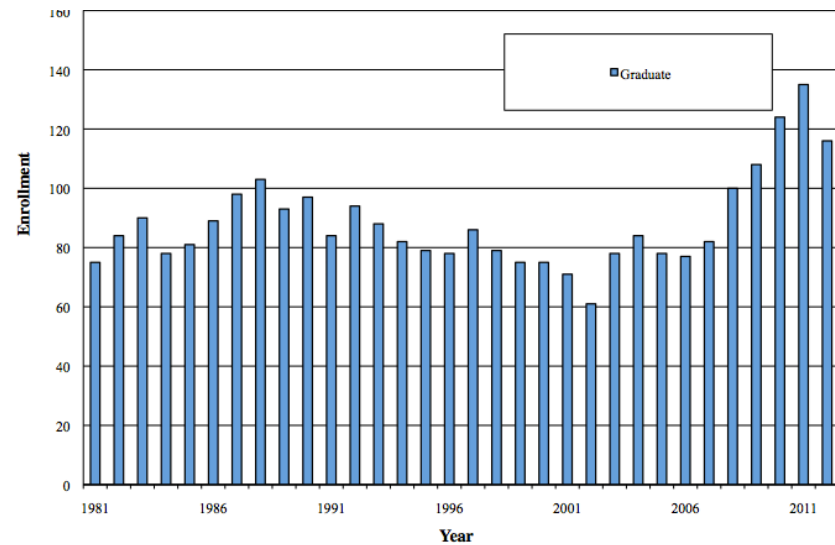
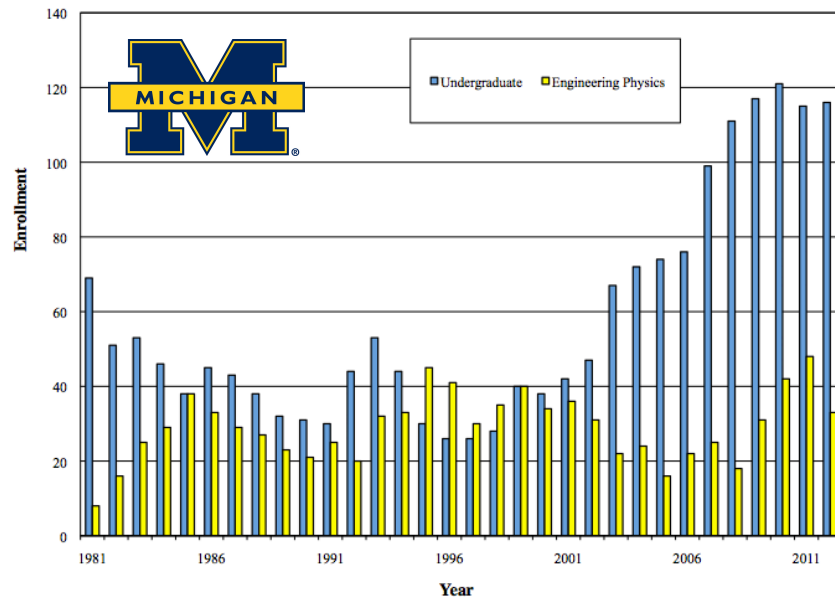
April 26, 2013  
Intensity Frontier Meeting, ANL

# A Renaissance in Nuclear Science

- Most major Nuclear Science & Engineering programs in the US have doubled in size over the past decade
- Students view the nuclear issue holistically as a societally important problem worthy of their future career
- We enjoy a large pool of well-prepared US students
- The 'demand signal' from the DOE labs in nuclear non-proliferation represents an outstanding opportunity for MSI

The NSSC seeks to capitalize on this opportunity and provide a large influx of trained S&E for the non-proliferation mission

Nuclear ST&E is a very hot field – application pressure from top American students has burgeoned this decade



# The NSSC reflects the priorities of the new NPR

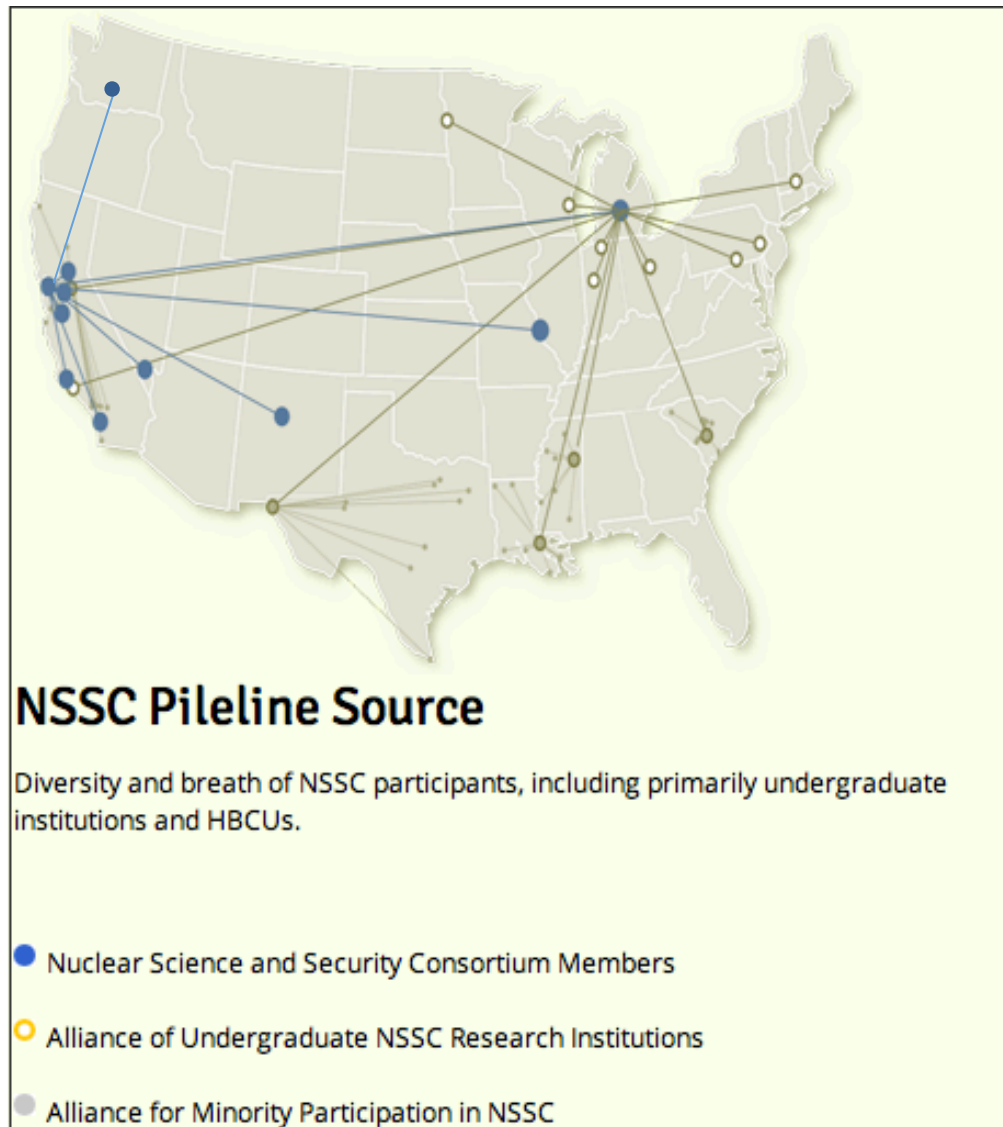
*“Investing in the scientific and technical underpinnings of our program is critical to implementing the President’s nuclear security agenda and to preventing nuclear terrorism or nuclear proliferation. As we push the boundaries of science and discovery, partnerships like the Nuclear Science and Security Consortium are a vital part of our effort to invest in the future of our programs by building a strong pipeline of new technical talent to our laboratories.”*



Anne Harrington  
NNSA Deputy Administrator for  
Defense Nuclear Nonproliferation

In 2010, DOE/NA-22 issued a FOA for a \$25M / 5 year program.  
In 2011, a UC Berkeley-led consortium was awarded the grant.

# The NSSC – 7 universities & 4 national security labs



University of California Berkeley

University of California Davis

University of California Irvine

University of California San Diego  
(Institute for Global Conflict & Cooperation)

Michigan State University

University of Nevada Las Vegas

Washington University

Lawrence Berkeley National Lab

Lawrence Livermore National Lab


Los Alamos National Lab

Sandia National Lab

# The NSSC has enabled high caliber, high visibility activities, such as summer schools

## UNLV – Radchem Fuel Cycle School

What Are Your Plans This SUMMER?



### Radiochemistry Fuel Cycle SUMMER SCHOOL

**WHEN:** June 4 - July 13, 2012

**WHERE:** University of Nevada Las Vegas

**WHO:** Undergraduate students in chemistry, physics, health physics, or nuclear engineering

This 6-week summer school focuses on training undergraduates in the fundamentals of radiochemistry with an emphasis on the nuclear fuel cycle. Students will receive at least \$ 3,600 for participation. Travel costs, housing one meal per day are also covered. Visits to national nuclear laboratories are included. Trips to General Atomics, San Onofre Nuclear Generating Station, and the Nevada Test Site are planned. The course has morning lectures and afternoon laboratories. Five weeks are devoted to independent laboratory research projects.

Applicants must be US Citizens. Applications are due by April 3, 2012. Twelve students will be selected. Selected applicants will be notified by April 7, 2012 contingent upon funding. Applicants must submit a statement of interest, resume, transcript (unofficial acceptable) and letter of recommendation.

The program, in its third year, is sponsored by the Department of Energy-Nuclear Energy and the Radiochemistry Program at the University of Nevada Las Vegas.

Full program details and application are available at: <http://radchem.nevada.edu/rfcss.html>



## Basics of Nuclear Reactor Operations University of California, Irvine July 9<sup>th</sup> – July 20<sup>th</sup>, 2012

The University of California, Irvine (UCI) is pleased to offer an intensive two week summer course in basic nuclear reactor operations that will prepare you with the theoretical and practical training needed to obtain a Nuclear Regulatory Commission (NRC) Reactor Operator's license.

### Hands-on Experience

- Nuclear reactor operation
- Radiation detection and measurement
- Nuclear waste separation
- Neutron activation analysis

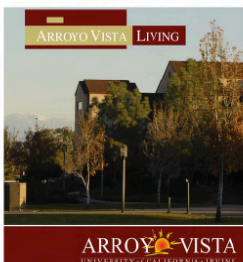
### Instructors

- Prof. A. J. Shaka, Department of Physics
- Prof. Mikael Nilsson, Department of Materials Science and Engineering
- Dr. George Miller, Department of Nuclear Engineering and Reactor Supervision

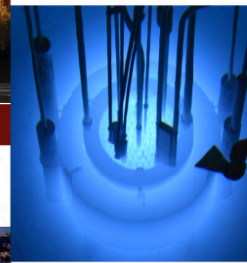
### Course Details

Enrollment for up to 20 students. Course material includes lectures, laboratory work, and transportation, including accommodations at the UCI (dbi), \$51 (sngl) for room and board. Meals are provided. Alternatives to the UCI eatery, with the two weeks, although all labs are within the UCI campus. With the Zip™ Cars. With the California climate, you will learn all the basics for passing the NRC exam. A PET scanner simulator, a PET scanner simulator will round out the course.


Live... **ARROYO VISTA LIVING**



...learn... **ARROYO VISTA UNIVERSITY OF CALIFORNIA-IRVINE**



...play... **ARROYO VISTA UNIVERSITY OF CALIFORNIA-IRVINE**



## NSSC Summer School in Nuclear Analytical Techniques

UC Davis, June 25 - July 6, 2012



Graduate and upper-level undergraduate students.

Due May 1 at: [http://lux.physics.ucdavis.edu/nssc\\_summerschool/](http://lux.physics.ucdavis.edu/nssc_summerschool/)  
[summerschool@physics.ucdavis.edu](mailto:summerschool@physics.ucdavis.edu)

### Activities:

- Activation Analysis using the MNRC facility
- X-ray spectroscopy with High Purity Germanium Detectors
- Neutron scattering at the Crocker Nuclear Laboratory
- Neutron detector work

### Speakers:

Mathaniel Bowden, Morgan Burks, Kareem Kazkaz (Sandia National Laboratory), Kevin Strecker (Sandia National Laboratory), Ben Liu (McClellan Nuclear Research Center), Daniel Cebra, Robert Svoboda, (UC Davis)

### Local Organizers:

Bob Svoboda  
 Mani Tripathi  
 Dan Cebra  
 Jim Shackelford  
 Michael Lerche  
 Jeremy Mock  
 Nick Winkler

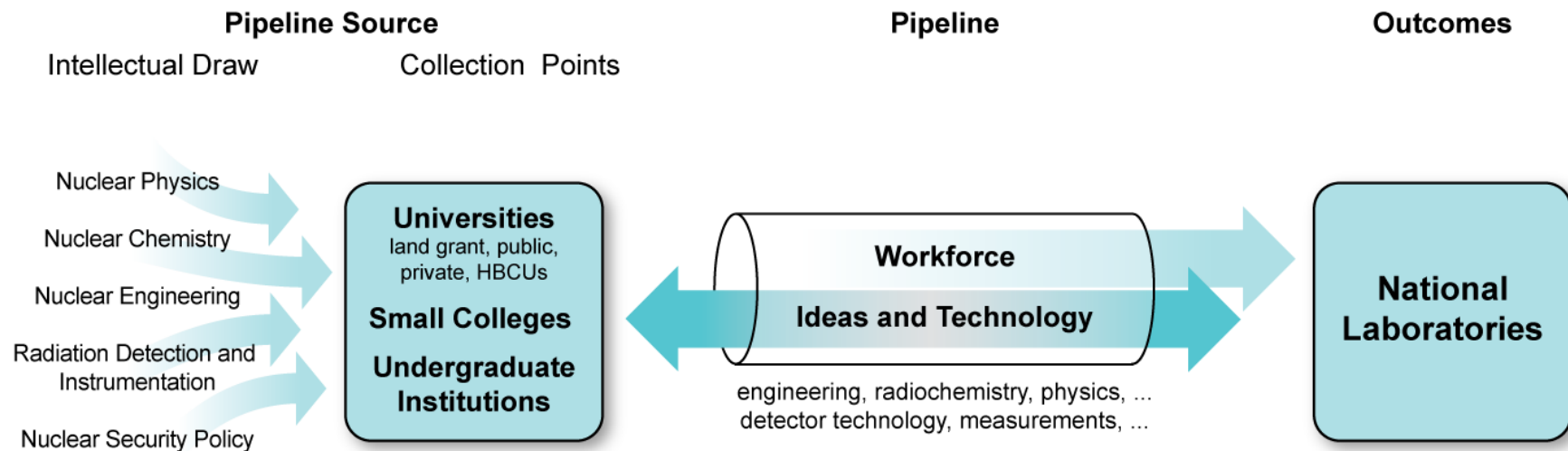
### Contact:

Bob Svoboda  
 bsvoda@physics.ucdavis.edu  
 754-9610

## UC Davis – Nuclear Analytic Techniques

## UC Irvine – Nuclear Reactor Operations

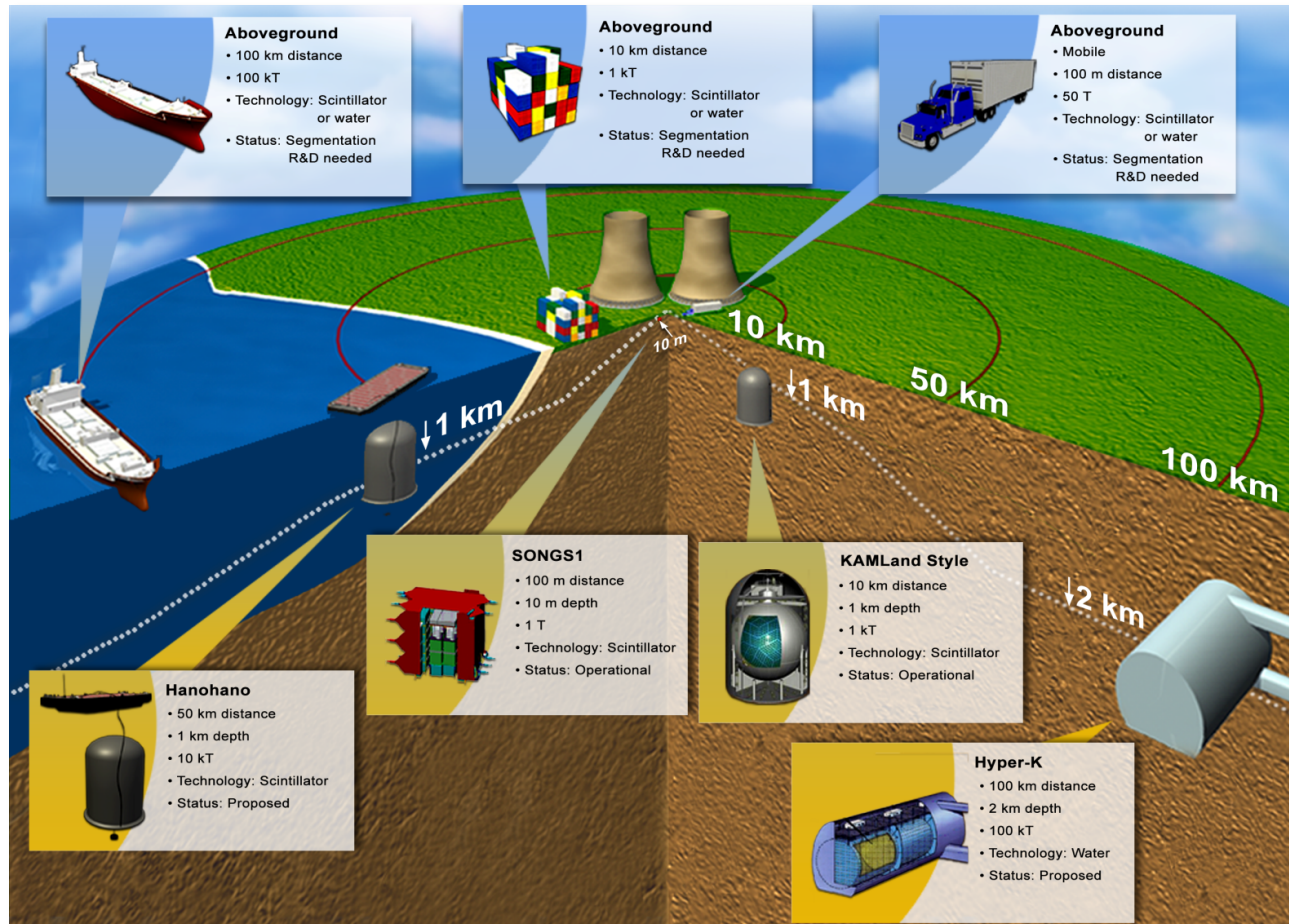
# SUCCESS depends critically on exciting research programs and unique facilities



The NSSC supports and draws young talent from fundamental physics, including neutrinos !



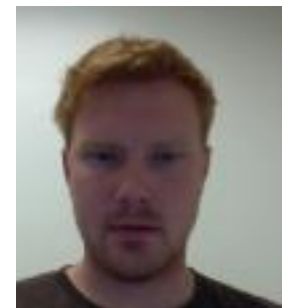
# NSSC supports Antineutrino Reactor Monitoring



Tim Shokair (PD)



Sasha Asghari (GSR)



Caleb Roecker (GSR)

NSSC and NA-22 WATCHMAN program jointly fund a UC Berkeley postdoc and two grad students

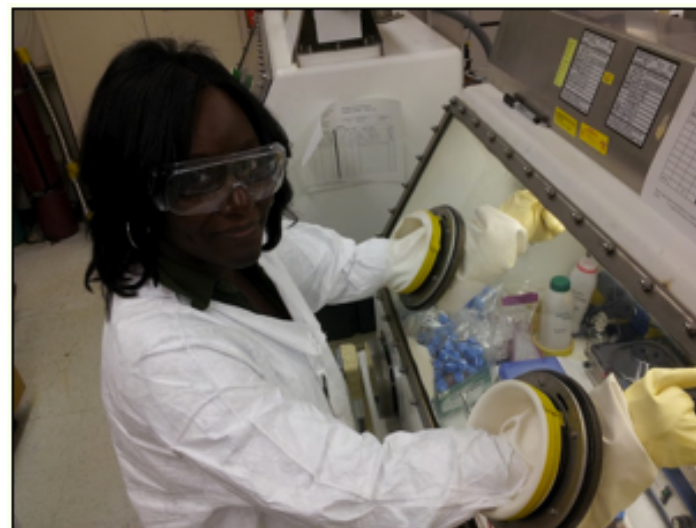


## Other neutrino activities supported by the NSSC

- CUORE search for neutrinoless double-beta decay
- Double CHOOZ antineutrino oscillations
- Development of Coherent Neutrino Scattering

## NNSA added an additional \$1.5M for a Minority Serving Institution (MSI) component

- Funds arrived just before summer 2012
- We published a call for NSSC-MSI Summer Research Fellowships
- Four students were accepted and worked at a partner institution
  - Expect to do around 15 this year
- We have just awarded 5 multi-year research grants for MSIs
  - Univ. Texas El Paso, Clark Atlanta, South Carolina State, Hampton, Fisk
  - All about \$250K
  - Funding PIs at HBCUs, HSI, etc. to do collaborative research with NSSC partner institutions
  - To support students, infrastructure, etc.



*Brittany Rogers of Alabama A&M worked with Prof. Heino Nitsche at UCB for 8 weeks this summer, learning plutonium chemistry & radiochemical techniques.*

Follow us at [nssc.berkeley.edu](http://nssc.berkeley.edu)



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## Participants

[UC Berkeley](#)  
[Michigan State University](#)  
[UC Davis](#)  
[UC Irvine](#)  
[UC/IGCC San Diego](#)  
[UN Las Vegas](#)  
[Washington U St Louis](#)  
[Los Alamos NL](#)  
[Lawrence Berkeley NL](#)  
[Lawrence Livermore NL](#)  
[Sandia NL](#)

## NSSC-MSI Fellows

[2012 NSSC-MSI Fellows](#)

## NSSC Alumni

[NSSC Alumni](#)

## NSSC Publications

- [NSSC Publications](#)



Czerwinski and Norman Named 2012 Fellows

## Radioactive waste leaking from six tanks at Washington state nuclear site



SEATTLE (Reuters) - Six underground storage tanks at the Hanford Nuclear Reservation along the Columbia River in Washington state were recently found to be leaking radioactive waste, but there is no immediate risk to human health, state and federal officials said on Friday.

The seeping waste adds to decades of soil contamination caused by leaking storage tanks at Hanford in the past and threatens to further taint groundwater below the site but poses no near-term danger of polluting the Columbia River, officials said. [READ MORE](#)

## UC Institute on Global Conflict and Cooperation announces its 2013-14 funding competition

The UC Institute on Global Conflict and Cooperation announces its 2013-14

funding competition. The deadline to apply is **March 1, 2013, 5 p.m. PST.**



## NSSC Webcast

### NSSC FIELDS

- [EDUCATION](#)
- [PHYSICS](#)
- [ENGINEERING](#)
- [INSTRUMENTATION](#)
- [CHEMISTRY](#)
- [POLICY](#)

## NSSC Pipeline Grid



## UPCOMING

Thu Feb 21 @ 1:00PM -  
[NSSC Monthly Webinar for February 21: "Delayed neutron spectroscopy -- without detecting any neutrons?"](#)

## LATEST NEWS

[Radioactive waste leaking from six tanks at Washington state nuclear site](#)

[UC Institute on Global Conflict and Cooperation announces its 2013-14 funding competition](#)

[2013 Nuclear Forensics](#)

*Nuclear news nationally*  
*Faculty, students, alums*  
*Job opportunities*  
*Funding competitions*  
*Seminars, workshops*  
*Summer schools*  
*Monthly webinars*  
*Links to similar centers*

## Summary and Concluding Remarks

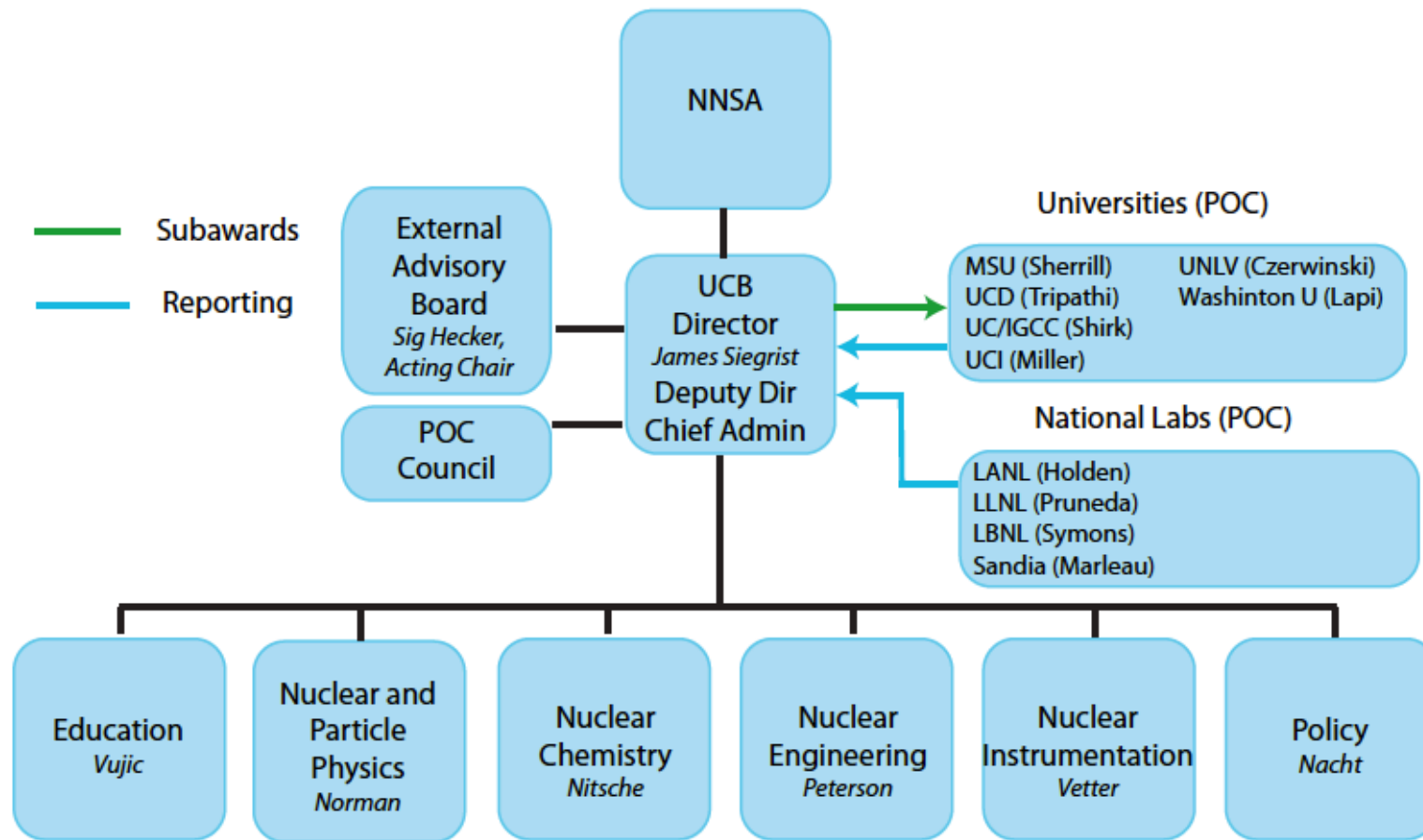
- Nuclear Engineering regularly reinvents itself, assuring its relevance, vitality and appeal to top young talent.
- There is currently strong interest in nuclear science and engineering among versatile and well-prepared US students.
- The NSSC represents a successful NNSA initiative to recruit, train and transition this talent to the non-proliferation mission, ~80 students currently
- We are off to a good start, but the ‘end-game’, i.e. hand-off to the laboratories is still in its early phases, a work-in-progress.
- We are appointing a Deputy for Laboratories to focus on campus-lab issues and to get “ground truth” on what is happening at all NSSC sites, including MSI
- The MSI call elicited a great response, but DOE consolidated its MSI programs recently, and it is unclear whether we will be able to issue another one. But the current MSI funds can be spent over 3 years.

*Many thanks to NNSA & we expect great things from our grads!*

*Backup Slides*



# NSSC Organization at Launch



KvB appointed as Executive Director, after Jim Siegrist went to DOE  
Brad Sherrill (MSU) appointed as Deputy Executive Director  
Jay Davis (Hertz Foundation) appointed as Chair of External Advisory Board

### Central Team

PI: Jasmina Vujic  
Exec. Dir.: Karl van Bibber  
Deputy ED: Brad Sherrill  
Administrator: Alina Sari  
RSO: Derek Johnson

### Lab POCs

LBNL: James Symons  
LANL: Morag Smith  
LLNL: Annie Kersting  
SNL: Craig Tewell  
PNNL: Alma Contrearas

### Focus Area Leaders

Physics: Eric Norman  
Instrum: Kai Vetter  
Engineering: Per Peterson  
Chemistry: Heino Nitsche  
Policy: Michael Nacht  
Education: Jasmina Vujic

## Management team: current composition

### University POCs

UC Davis: Mani Tripathi  
UC Irvine: George Miller  
UCSD/IGCC: Tai Ming Cheung  
UNLV: Ken Czerwinski  
Wash. Univ. Suzanne Lapi  
MSU: Michael Thoennessen

### NNSA NA-221

Program director: Col. Dave Lagraffe  
Contracts monitor: Erwin Fragua

## Demographics of our young talent (August 2012)

- Hired in Year I:
  - UGR/Jr. Spec. 18
  - GSR 37
  - Postdoctorals 4
  - MSI Fellows 4
  - **TOTAL 63**
- Data mostly complete
- Drawing from top schools

### Educational Background: GSR+PD

Univ. California (all)	10
MIT	3
Univ. Penn.	2
Univ. Mich.	2
Texas A&M	2
Stanford	1
Yale	1
Johns Hopkins	1
Carnegie-Mellon Univ.	1
Purdue	1